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      KOLODNER, Richard
      WINAND, Nena

<120> A METHOD OF DETECTION OF ALTERATIONS IN MSH5

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Ile Ile Leu Leu Pro Ser Val Asp Phe Gly Pro Glu Ile Ser Lys Gln
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Arg Leu Leu Ser Gly Asn Tyr Ser Phe Ile Ser Asp Ser Met Thr Ala
145                     150                     155                     160

Thr Glu Lys Ile Leu Phe Leu Ser Ser Ile Ile Pro Phe Asp Cys Val
                165                     170                     175

Leu Thr Val Arg Ala Leu Gly Gly Leu Leu Lys Phe Leu Ser Arg Arg
                180                     185                     190

Arg Ile Gly Val Glu Leu Glu Asp Tyr Asp Val Gly Val Pro Ile Leu
            195                     200                     205

Gly Phe Lys Lys Phe Val Leu Thr His Leu Val Ser Ile Asp Gln Asp
    210                     215                     220

Thr Tyr Ser Val Leu Gln Ile Phe Lys Ser Glu Ser His Pro Ser Val
225                     230                     235                     240

Tyr Lys Val Ala Ser Gly Leu Lys Glu Gly Leu Ser Leu Phe Gly Ile
                245                     250                     255

Leu Asn Arg Cys Arg Cys Lys Trp Gly Gln Lys Leu Leu Arg Leu Trp
            260                     265                     270
```

```
Phe Thr Arg Pro Thr Arg Glu Leu Arg Glu Leu Asn Ser Arg Leu Asp
        275             280             285

Val Ile Gln Phe Phe Leu Met Pro Gln Asn Leu Asp Met Ala Gln Met
    290             295             300

Leu His Arg Leu Leu Ser His Ile Lys Asn Val Pro Leu Ile Leu Lys
305             310                 315                     320

Arg Met Lys Leu Ser His Thr Lys Val Ser Asp Trp Gln Val Leu Tyr
            325             330                     335

Lys Thr Val Tyr Ser Ala Leu Gly Leu Arg Asp Ala Cys Arg Ser Leu
            340             345                 350

Pro Gln Ser Ile Gln Leu Phe Gln Asp Ile Ala Gln Glu Phe Ser Asp
        355             360                 365

Asp Leu His His Ile Ala Ser Leu Ile Gly Lys Val Val Asp Phe Glu
    370             375                 380

Glu Ser Leu Ala Glu Asn Arg Phe Thr Val Leu Pro Asn Ile Asp Pro
385             390                 395                     400

Asp Ile Asp Ala Lys Lys Arg Arg Leu Ile Gly Leu Pro Ser Phe Leu
            405             410                     415

Thr Glu Val Ala Gln Lys Glu Leu Glu Asn Leu Asp Ser Arg Ile Pro
            420             425                 430

Ser Cys Ser Val Ile Tyr Ile Pro Leu Ile Gly Phe Leu Leu Ser Ile
        435             440                 445

Pro Arg Leu Pro Phe Met Val Glu Ala Ser Asp Phe Glu Ile Glu Gly
    450             455                 460

Leu Asp Phe Met Phe Leu Ser Glu Asp Lys Leu His Tyr Arg Ser Ala
465             470                 475                     480

Arg Thr Lys Glu Leu Asp Thr Leu Leu Gly Asp Leu His Cys Glu Ile
            485             490                 495
```

Arg Asp Gln Glu Thr Leu Leu Met Tyr Gln Leu Gln Cys Gln Val Leu
            500   505   510

Ala Arg Ala Ser Val Leu Thr Arg Val Leu Asp Leu Ala Ser Arg Leu
            515   520   525

Asp Val Leu Leu Ala Leu Ala Ser Ala Ala Arg Asp Tyr Gly Tyr Ser
    530   535   540

Arg Pro His Tyr Ser Pro Cys Ile His Gly Val Arg Ile Arg Asn Gly
545   550   555   560

Arg His Pro Leu Met Glu Leu Cys Ala Arg Thr Phe Val Pro Asn Ser
            565   570   575

Thr Asp Cys Gly Gly Asp Gln Gly Arg Val Lys Val Ile Thr Gly Pro
            580   585   590

Asn Ser Ser Gly Lys Ser Ile Tyr Leu Lys Gln Val Gly Leu Ile Thr
            595   600   605

Phe Met Ala Leu Val Gly Ser Phe Val Pro Ala Glu Glu Ala Glu Ile
    610   615   620

Gly Val Ile Asp Ala Ile Phe Thr Arg Ile His Ser Cys Glu Ser Ile
625   630   635   640

Ser Leu Gly Leu Ser Thr Phe Met Ile Asp Leu Asn Gln Val Ala Lys
            645   650   655

Ala Val Asn Asn Ala Thr Glu His Ser Leu Val Leu Ile Asp Glu Phe
            660   665   670

Gly Lys Gly Thr Asn Ser Val Asp Gly Leu Ala Leu Leu Ala Ala Val
            675   680   685

Leu Arg His Trp Leu Ala Leu Gly Pro Ser Cys Pro His Val Phe Val
            690   695   700

Ala Thr Asn Phe Leu Ser Leu Val Gln Leu Gln Leu Leu Pro Gln Gly
705   710   715   720

Pro Leu Val Gln Tyr Leu Thr Met Glu Thr Cys Glu Asp Gly Glu Asp

```
                    725                    730                         735

Leu Val Phe Phe Tyr Gln Leu Cys Gln Gly Val Ala Ser Ala Ser His
            740                745                750

Ala Ser His Thr Ala Ala Gln Ala Gly Leu Pro Asp Pro Leu Ile Ala
        755                760                765

Arg Gly Lys Glu Val Ser Asp Leu Ile Arg Ser Gly Lys Pro Ile Lys
        770                775                780

Ala Thr Asn Glu Leu Leu Arg Arg Asn Gln Met Glu Asn Cys Gln Ala
785                790                795                         800

Leu Val Asp Lys Phe Leu Lys Leu Asp Leu Glu Asp Pro Thr Leu Asp
                805                810                815

Leu Asp Ile Phe Ile Ser Gln Glu Val Leu Pro Ala Ala Pro Thr Ile
                820                825                830

Leu
```

```
<210> 55
<211> 232
<212> DNA
<213> Human

<400> 55
gtaacctccg cgtgacagaa tgagggtggg gcgcgtggag tttcccacaa tctgtacttt
60
agttaaatac ccgagaattc acctcctgtg tccacagctc tccacgcccc tcagccctgc
120
cccgcagccc tgtatcagaa gtacttagcg ctttgcattc tgcgcgccac cctaccccgg
180
cctcctctgt gaatcgttgc ttccgaaccg ccctcacttt ttgcatccgc ag
232


<210> 56
<211> 74
<212> DNA
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<213> Human

<220>
<221> intron
<222> (73)..(74)
<223> N = A or T or G or C

<400> 56
gtctctgagg ggagtagaaa cttgaatgga gagttgatgg gaatttaaaa taaaagaggg
60
ttgggagccg ggnn
74

<210> 57
<211> 189
<212> DNA
<213> Human

<400> 57
aaaaaaaaac agggttggga agagctgggc aagtctctta cctcctgagt ggctgtttca
60
cattcactaa atggggggtga tgatgcctat ctcagagatt tgagaaaatg attaaattat
120
ataagacatg gtaaacccta cacttatgag tgattctaat agtgatttcc tttcttcctt
180
gctggacag
189

<210> 58
<211> 450
<212> DNA
<213> Human

<220>
<221> intron
<222> (449)..(450)
<223> N = A or T or G or C

<400> 58
gtggggatgg aaccatgaat tcctctgctc tctgggattg cagatgtgtt acacacacac
60

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acacacacac acacacacac acacacatat tttttttttc tagacagagt cttgctctgt
120
tacccaggct caagtgcagt ggcgcaatct tggctcactg cagcctccac ctcctgggtt
180
caagcaattc tcctgactca acctcccgag tagctgggac tacaggcgtg tgccaccaca
240
cccagctagt tttttgtgtg tgtttttagc acagacggtg tttcaccatg ttggccaggg
300
tggtctcaaa ctcctgacct tgtgatccgc ccaccttggc ctcctaaagt gctgggacta
360
caggtgtgag tcaccacgcc cagccatgtt ttacttacat taactcacct cactgtctag
420
catattttgt gttgctgtaa ggaaatacnn
450
```

```
<210> 59
<211> 323
<212> DNA
<213> Human
```

```
<400> 59
ggcgacaaat atatatgacg tatttacaat gtttcaggtg cttcagattc agccctgggc
60
aaatcagtca tgtctgttct ccaggggttt acagcctagt gacaacatcc agaacatccc
120
acttccctct caccatccca ccactcttaa ctacttttct aaatctcaac ttctacctgt
180
gttcccactg tgcagagcac tccctactcc tagggaggaa atgtttttga gaaggagagg
240
ggtaggaaga ggagggctat gggttttctc ttagtcaaag acaaagatcc tttaactcat
300
ttgatctctg ttctccttcc aag
323
```

```
<210> 60
<211> 150
<212> DNA
<213> Human
```

```
<400> 60
gtaaggactt ggtaaaggat agagggaaaa tggggaagga ctaatatatg gaatattcca
```

60
gggggctaga attgggtgag agggagtgtc agacagaggt agaaggactg agatgtaaag
120
aatgatagcc ttttctttcc tcccccacag
150

<210> 61
<211> 733
<212> DNA
<213> Human

<400> 61
gtatctcctt ccttttgctt tgcctaactc cctgttccgg tgtcccattc tttcccccaa
60
ctctaccttc atcatcacag atctcccctc tgccttatgt catcctaaac ctttgtgctc
120
ctcatgccct atgacctgtc cccccaagat ctctcctgct ccctaccctt taataatctg
180
cagcttattg ggaagcctct gcttaagtca tgtctaggga tgagggcctc ccctgaggag
240
tggtgacact ttttggacag ggttttattg ttggaattct ccccattaag ttaaagcctt
300
ttatcaccaa accaaaaggc actgcctcag tgacccttat tatgatccat aaggcacttc
360
tataactttc ctaggtttac aataagaaca ggagtgtact atcctaatta gatattaagg
420
cattagtgtt actagttcta ttaataccat tattttgacc aaaatcctca attccagaca
480
gatgtctact ttcctcagcc atttatcttt ctcaggctgt gctttcagac aagtatcttt
540
atattatatg tagaataaaa agagaattag actaagagtc tgaaaatttg gttcttgctc
600
tagctttcca ttaactgcct gtgtgagctt gggcaagtca ataatctct cttgcttcta
660
ttgtctcatt cttaaaatgg ggtgaaaaaa ttgagctaca agaccgttcc ctttgcttgc
720
ctccctcaaa tag
733

<210> 62
<211> 164

<212> DNA
<213> Human

<400> 62
gtgagattgg tcctggggga taagggctgg gaggcggcac aagtgctagg gctgaattct
60
gggaggtact ggcctagccc tggaaaatag taactttccc tggtgctctg cagcccccag
120
gagatttaag atttaccccg attccactgc tgatcccctc ccag
164

<210> 63
<211> 246
<212> DNA
<213> Human

<400> 63
gtaggtgatt caccccaacc ccaaccaaag taatgtggga ttgggaggcc tgaaaagtaa
60
agtggggggtg gggtgtggat gtggctgtga cccagtgggt caagggctct aggacacccg
120
ggagaatcta agggctaatg agactttggg aagaagactg ggacaatatt cagagagggg
180
gacaaaggaa gtggagttgt ggaacgaact cagactgctt cctgcttttt tgttttctgt
240
cctcag
246

<210> 64
<211> 413
<212> DNA
<213> Human

<220>
<221> intron
<222> (412)..(413)
<223> N = A or T or G or C

<400> 64
gtaaagaggt ggaggcatgc tgctgtctct ggggagggag aaggattaag tttaatgccc
60

```
caataatcct aatgaggctc tagtttccct aatcctgggg ctattaagat ctctctcctt
120
gaaggaaagg gaaggggggt tttgagggaa agagaggaag aaaagcataa agatactagc
180
tttcttttct atagggagaa actgaggcaa agaaaagtaa gggacaaacc ttacatcaag
240
atatgatctc ggctgggcgc ggtggctcat gcctgtaatc cccgcgcttt gggaggccaa
300
ggcgggtgga tcgcctgagg tcaggagttt gagacctgac caatatggta aaaccccgtc
360
tctactaaaa atataaaaat tagctgggtg tgttgtgcgc ctgtaatccc ann
413
```

```
<210> 65
<211> 136
<212> DNA
<213> Human

<400> 65
tttttttta aaaaaaaaa aaaaagacg tgatctcagg aggatatccc ctgtccccat
60
tccatttatc agtcctcaat tcttattccc ctcaaaagtc caagttaccc caaactcctc
120
catttctcct cgacag
136
```

```
<210> 66
<211> 356
<212> DNA
<213> Human

<220>
<221> intron
<222> (355)..(356)
<223> N = A or T or G or C

<400> 66
gtaggtgtgc cccatccctc atctcacgta caaagaccta ccagaaaagc aattggctcc
60
aaagatgtgt cccagcctcc cttcccactt cactcccatt gtcagatatc tctttcatgc
120
```

caatccaaat ttcttaccta tttgtacccc ccgcccccca agcttgagca tcttcccata
180
ctttgtggct gtacagtgtg ttgcatatca gccattactt taccaattct gtgttccttc
240
cctgggtttg tatgaatgtt tctactagtt gggtacctgt tagggacttt gggagacctt
300
gtgtatagag aagagttttg taactgcata actgcctatt tgatttgtat agagnn
356

<210> 67
<211> 426
<212> DNA
<213> Human

<400> 67
ccaggagtag agggagagac agaaacagcc aacaatggcc cagaaaatgg atgatatatt
60
agataaggga agaaatgagt taccagattg gggagagatg gtttggatgt caaagcaggt
120
gatcggtgac gtcagcgtcc gagggaagac ggctgccacc ggcggggcca gttgagggaa
180
ctaggtagtt aagtgttgtc gggctaaaag tccctagagt gtccatccct cccccatctc
240
catgtgcggt aatcccagct catttagggg ccaggcacca actttggttg cctttgtgcc
300
ctcccaggcc agcttcctca acaaccagca cctctgactg gatgcctcag gttagacaca
360
taaacacatt ccattgccct gtccgtgcct tgtaacaagt tcactccctg ccttatccct
420
cacaag
426

<210> 68
<211> 360
<212> DNA
<213> Human

<220>
<221> intron
<222> (359)..(360)
<223> N = A or T or G or C

<400> 68

gtgagtgggt cccacacata ctacacacta atgcatgaat tccatatgca cactacatac
60
taagcctact aatggcagta tacagattct cacatacacc accccaccta gtagtagtaa
120
agcaactgcc ctttactgag cactggctaa ctgcatttca tccttataac agctttgtgt
180
agtagctgat atgcatctca ttttttgttg tcagcgcagg tacacatata cattgatgat
240
acacagactt gcacacatac agcagcagga aaaaacacaa aatgtaaggc cgggcacagt
300
ggctcacacc tgttatcagc actttggggg gccaacgctg ggtgaccttc catctttgnn
360

<210> 69
<211> 447
<212> DNA
<213> Human

<400> 69

cacaggaaga atatgaaaag atgaatgtct gttgctgtta cccagagaca ctttcacagc
60
taaaaagaca tacaaactca tactgactca ccgtctctta ctcagcctca gagtgagctg
120
cagtgttggc acacaaatac ctcaacacac tgctctcctt ctaaaatatt gacaagctcc
180
gttacttata tacatggaat gacacacggt cttatccgtt gaaactgtga tatgtagaca
240
caattatgct cacatctagc aattttcagt agatacatgt aaacacacct gaatgggtag
300
gacactgcac ttgccactac attcccatag cacatcgtgg atacatattg ccacaatccc
360
cagggactgc aagcacactt tttggcaaac tgagatcaag atgatagatg taacttgtag
420
tacccccacc caaaccctca cttccag
447

<210> 70
<211> 127
<212> DNA

<213> Human

<400> 70
gtgagcccag ggtggagggc agggaggtgg ggaaggaggt tgagggctga tactgggcag
60
tgggcttctt gaggggcatt agagtgaggg aagagaaaac agcggctgta accttgtctg
120
actgtag
127

<210> 71
<211> 30
<212> DNA
<213> Human

<220>
<221> intron
<222> (29)..(30)
<223> N = A or T or G or C

<400> 71
gtaaggcctt ccttcttgaa tcccaaaann
30

<210> 72
<211> 222
<212> DNA
<213> Human

<400> 72
tacaggcatg agccactgtg cctggccagg accatatctt aattgtcttt gtagtttcag
60
tgtttggtac agtgcctctc actgtttctt tttgcctttg agatcttccc tctttgttac
120
tgtgatcttc cctactggtc tttgttcttc tgagtctgtc cctatcacca cctcaacccg
180
agctggatgt ggcctgtcct ccttttttgtg tttctctcac ag
222

<210> 73

<211> 254
<212> DNA
<213> Human

<400> 73
gtgagtagaa ggaaaaaggg agtgcaccca gggaggtcag ggagagagaa tgcagtgtgc
60
aagatgggga aacatggaag atattgaggt caattggata aagaatggga tggtgggagg
120
aggcagcaga acttcaggga agtatctgga gggtgagagt taaaggagga ctgcagggag
180
aattggggcc caaggagagc tgaggaacag gacagagggt gccaggtcct aagaaacagt
240
acttatctcc tcag
254

<210> 74
<211> 145
<212> DNA
<213> Human

<400> 74
gtgagtgttg ggtgtggatg ggcctgtgag ccctgcgcag tgatggagta ccatccttgg
60
caggtggtca ccacagctgg ggatcttcat agcaaccagg gcaggagact cacttttgat
120
aaccacctgt cttccaccct cgtag
145

<210> 75
<211> 98
<212> DNA
<213> Human

<220>
<221> intron
<222> (97)..(98)
<223> N = A or T or G or C

<400> 75
gtgagggcag gagagtgggt gtagccttca gatgtctttt gggggagata ttaggcttat

60
gaaagacata ctggtagata agaaaacttg tggggcnn
98

<210> 76
<211> 83
<212> DNA
<213> Human

<400> 76
atcttttaag ctcccttggg atggggaggt tccagtaagt ctccaaacaa gagagtagag
60
tatctcctct ttactctccc cag
83

<210> 77
<211> 247
<212> DNA
<213> Human

<400> 77
gtaagaccct caacctctgt aaggtgagtg atgaggaaaa tgagtcagca gctgaggaag
60
agcgttactc tacagcagca ctgcccaata tgggatctct cctctgtagt tttactctga
120
gctttaccag cactgagaca aaggaaagag aagtcagagt taggggctgg aggtggggtt
180
agaaagatgg ggaaggagag gaggaccaag agatgcaaag tccacagctt tgaaccccctg
240
tacccag
247

<210> 78
<211> 273
<212> DNA
<213> Human

<400> 78
gtgaggaaaa gccagaggtt atatgcattg taagatgttt aaaaaaagca gcagccaggg
60

gaaggagggg agtgggcaac ttggggatgc ttccaacagg cccctcctct tcctgctctc
120
tgtctcgctc actctgactc tatctttttcc tctgaatgtc ttgaggtctc agattgtatc
180
tgcaacctgt ttccagatcc ccctaggggc ctctgcctct ccttcacttt ccccctggaac
240
tgacctccag ctcccttcct cacccactcc cag
273

<210> 79
<211> 114
<212> DNA
<213> Human

<400> 79
gtaagaatag aggcgggtgg aggaatacac atgaggggcc caaaggctac atcttctggg
60
ggttcatcta tcttgatcca caagccatgc gaggtgcctc tccgcccact gcag
114

<210> 80
<211> 473
<212> DNA
<213> Human

<400> 80
gtgaggagaa gccctgcagc ctgggcctct ggcgtctcct gcatctactc caccccctact
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tgccagccaa ctcaggctcc tgcagctctt ctcccatttt ctgaccccgc tcttcatgaa
120
aggaccatca cccacatccc tgtgcttcca cctcacatgt tcttattctc cactggagag
180
ccatgctcta atggaacttt ccgtggccca aattccttca cctgcctctg agtaggtaca
240
caccactccc aagtatgtct ctgcccacgt cccgtgcctc ttcactgatt ctaaattagc
300
ccacagggct atggtcagga ttcggggagg agagacagag tcagtgtgtc tgttacctat
360
ttctcctgtt tcaccctgtc catttctctt tgatgtgcca ttcatgcctt gagcctcact
420
ttcacctcag cccacggcac caggccccag gccctgtctc cttccctatt cag

473

<210> 81
<211> 348
<212> DNA
<213> Human

<400> 81
gtcaaaggga acaaagggag gtgggattga ggaaggggat aatgggaaag gaacccctga
60
aaatgctcat aacaggaaag catgccctct gctgcatgcc ctttatacta aaagtgggga
120
gcactaaggt cagagataag aagaatcaat accataaaca tttcttgaac ccttgtttca
180
tgtgagtcac tgttggcaaa gaggatgaac aaagcgtgca cctcaccatt caagaacttg
240
cagtgcagta gggagggcat gtatacagct ttattcacag gccaactgtg gtcagtgcgt
300
tacgggcttc caatactaac ttccccttgt ccaccttata cccagcag
348

<210> 82
<211> 209
<212> DNA
<213> Human

<400> 82
gtgaggggag aaactgatga ggggagaaac taaggagggg aaaatggagg aggatgaagg
60
agcatgacag tgaggctggg cctctggaat ggaatagggc tgtgtgggca gaaaagaaat
120
agaacacgag acaggaaag gcagtgcaag tgcagagggg catatggggt ccccatggct
180
ccgaatgcta acctctgccc tctttgcag
209

<210> 83
<211> 202
<212> DNA
<213> Human

<400> 83

gtgaggagac caatctagct cctcggggac ccccaggctg ggcatttccc agaggtgggg
60
attggctcct ctatcagaac aagggctccc tcagcacaga gaccacatcc cttcccttt
120
ctccctcccc acaggattgg ccaagggttt caggacagga aggaggtgat tgatgataca
180
ctgtctttta ttctctttta ag
202

<210> 84
<211> 155
<212> DNA
<213> Human

<400> 84
gtgatgagat ccaaatgtgc aaccacctcc acatcagagc tcccttcat tcctagtcct
60
actgggcctg ggtctaggtc cacaggattt ctgacccta tttcccctc tcttccccac
120
tcccttact cctcccacct tcttgcttgt cctag
155

<210> 85
<211> 215
<212> DNA
<213> Human

<400> 85
gtgcgtatat ggccccagtg tctttaccct ctctgcatct tctcctgcaa ctcttctccc
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ccctccagca ctttgccctt cagaaaccca ccatttcttt ctgaaatccc taaatcttca
120
agatcccagg ttttctgtgc cacagcctct cccctctgcc cagggatttg gttgtccatt
180
ctgccataaa tcttgcgatt ttctctcttc ttcag
215

<210> 86

<211> 29
<212> DNA
<213> Human

<400> 86
gctgctcagg tatacagtac cacgctccc
29

<210> 87
<211> 29
<212> DNA
<213> Human

<400> 87
agatccgggg tgaggagccc gtggtagga
29

<210> 88
<211> 29
<212> DNA
<213> Human

<400> 88
gaatggcagg tgagaagggg ccccatgtc
29

<210> 89
<211> 29
<212> DNA
<213> Human

<400> 89
ctcaagcagg tgaggggccg ccaagctgg
29

<210> 90
<211> 29
<212> DNA
<213> Human

<400> 90
accaactcgg tgcggaggaa aatgaagag
29

<210> 91
<211> 29
<212> DNA
<213> Human

<400> 91
ttcccatccc aaccctccag gctgtggtt
29

<210> 92
<211> 29
<212> DNA
<213> Human

<400> 92
ctctctctct ccttctccag accaggaga
29

<210> 93
<211> 29
<212> DNA
<213> Human

<400> 93
tgtctctcta cccaccacag gcatcctct
29

<210> 94
<211> 29
<212> DNA
<213> Human

<400> 94
tctcccctgc cctggcccag gtaggcttg

29

<210> 95
<211> 29
<212> DNA
<213> Human

<400> 95
tcacctctgc cctttgacag gtggatggc
29

<210> 96
<211> 79
<212> DNA
<213> Human

<400> 96
gtatacagta ccacgctccc caagcaaagt caagatgaga gaagacgtga cttgtaacct
60
tcccatccca accctccag
79

<210> 97
<211> 135
<212> DNA
<213> Human

<400> 97
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